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Recent beta-delayed fission investigations at ISOLDE and future possibilities

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Beta-delayed fission (β DF) provides a means to obtain a wealth of information on fission of exotic isotopes [1,2]. On top of that, it plays an important role in the nucleosynthesis as it contributes to the termination and fission recycling in the r process and thus impacts final abundances of elements in the Universe [3].

In β DF process, an excited state populated in the daughter nucleus via β decay undergoes fission. The excitation energy is limited by Q_β value, which is typically less than 12 MeV. Therefore, β DF allows us to study so called low-energy fission, which is sensitive to nuclear structure. It enables investigation of fission properties (such as fission fragment mass distributions, fission barriers, etc.) of isotopes for which other approaches to low-energy fission studies would be extremely difficult or currently impossible [1,2].

This contribution will mainly focus on β DF investigations that took place at ISOLDE in recent years, namely the study of ^{188}Bi [4] and the search for β DF in ^{178}Au . Both isotopes have two long-lived β -decaying states, which we studied individually by employing selective power of RILIS to obtain isomerically separated beams. This mode of measurement gives an additional possibility to explore spin dependence of fission, because of the strong spin selectivity of β decay. Future plans and possibilities for β DF studies using IDS will be discussed as well. The aim will be to probe the neutron-rich region around actinium, which is more relevant to r process compared to neutron-deficient regions studied in detail until now.

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Author: ANDEL, Boris (Comenius University (SK))

Co-author: ON BEHALF OF IS608 AND IDS COLLABORATION

Presenter: ANDEL, Boris (Comenius University (SK))

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